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SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE •



JANUARY 23, 1932

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DO YOU KNOW THAT

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Aluminum cloth is now being made in various colors and designs.

The Bureau of Fisheries has a new boat, a floating laboratory for the study of shrimp.

Experiments at Cornell University indicate that farmers can produce the tough-skinned, brightly colored onions that the markets demand by adding copper sulphate to the fertilizer used on the onion fields.

As late as 1911, bows and arrows were used by soldiers in China, when a Manchu garrison was attacked and had to supplement the supply of rifles with archery equipment.

In cases of tuberculosis, not more than one per cent. need a great change of climate, nor will they benefit especially by going far away from home or friends to make the change, says a New York State health officer.

A new frozen fruit product has been developed in the U. S. Bureau of Chemistry by pulping pitted fruit, adding a sugar sirup, mixing thoroughly, and then freezing at very low temperature.

Ultraviolet lamps small enough to be swallowed, where they can shed their rays on diseased stomachs, have been produced in Europe.

It has been proposed that Ohio have a "super-game" ranch, where improved types of rabbits and raccoons and other game animals would be produced and liberated.

Skulls of ancient Egyptians sometimes show a peculiar symmetrical thinning, which one anthropologist attributes to the fact that heavy wigs were worn.

If physicians only knew how to eliminate the common cold, pneumonia would be largely eliminated, says a New York physician.

Government scientists have found that rich soil protects corn against frost, both in early spring and late fall.

Mountain lions once roamed over most parts of the United States, the east coast as well as the west.

Analyzing the size of living things, Julian Huxley found man to be midway between the star and the atom.

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Science Service presents over the radio, an address

PUBLIC HEALTH PROGRESS

By Dr. Hugh S. Cumming, Surgeon-General, U. S. Public Health Service

Friday, January 29, at 3:45 P. M., Eastern Standard Time

Over Stations of

The Columbia Broadcasting System

MEDICINE

Anemia Treated by Injection Of Liver Extract into Vein

Only Four "Shots" of Highly Concentrated Substance Necessary to Restore Blood of Sufferer to Normal

INFREQUENT "shots" of a potent liver extract into the veins of sufferers from pernicious anemia constitute the newest treatment of this disease developed at the Henry Simpson Memorial for Medical Research of the University of Michigan.

Six years ago when liver began the conquest of this once fatal disease the patient had to eat half a pound of liver a day. Then a more palatable extract was made. Later even more concentrated preparations were devised.

Now Dr. Raphael Isaacs, Dr. Cyrus Sturgis and associates at the Simpson Institute in Ann Arbor have succeeded in producing a liver extract, about thirty times as powerful as any previously developed ones, and suitable for administration by intravenous injection instead of having to be taken by mouth. The new extract has been used successfully for some months and will be available to all physicians in a short time. Only four to six injections are necessary to restore the blood of an anemia sufferer to normal, after which health may be maintained by injections given by a physician at intervals of from four to six weeks. No treatment is necessary in the meantime.

Ordeal for Many

The history of the clinical conquest of this once-dreaded disease began in 1926 when Dr. George R. Minot and Dr. William P. Murphy of Harvard University reported the successful treatment of patients with a diet containing large amounts of liver. Eating from one-quarter to one-half a pound of liver every day for the remainder of their indefinitely prolonged lives soon became an ordeal for the many to whom liver was distasteful. Extracts of liver and of dried hog's stomach were developed and found successful, but these also had to be taken every day by mouth, though the actual quantity was much smaller. The liver extract was unfortunately quite expensive, and even calf's liver, formerly relegated to the cat's plate, soared to unprecedented high prices. So

the new extract will be hailed with joy by many liver-eaters.

Before liver was actually used to treat human sufferers, Dr. George H. Whipple of the University of Rochester had discovered, from observations on dogs, that liver was a powerful stimulator of the red blood cells that are lacking in pernicious anemia. The next step was Dr. Minor's perfection of the treatment for clinical use.

Extract by Mouth

Other chapters in the history of pernicious anemia conquest are the development of the liver extract to be taken by mouth by Dr. E. J. Cohn of Harvard Medical School; the development of the hog's stomach extract by Drs. Isaacs and Sturgis and Dr. Elwood A. Sharp of the Department of Experimental Medicine of Parke, Davis and Co.; the discovery of Drs. William B. Castle, Wilmot C. Townsend and Clark W. Heath of the Thorndike Memorial Laboratory, Boston City Hospital, that beef muscle acted upon by normal human stomach juice forms a substance that promptly alleviates pernicious ane-

mia, and that the normal human stomach secretes a hitherto unknown substance that prevents the development of pernicious anemia; and, finally, the isolation from liver, by Drs. R. West and H. D. Dakin and Marion Howe of Columbia University College of Physicians and Surgeons, of a crystalline salt which is active in pernicious anemia.

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PHYSICS

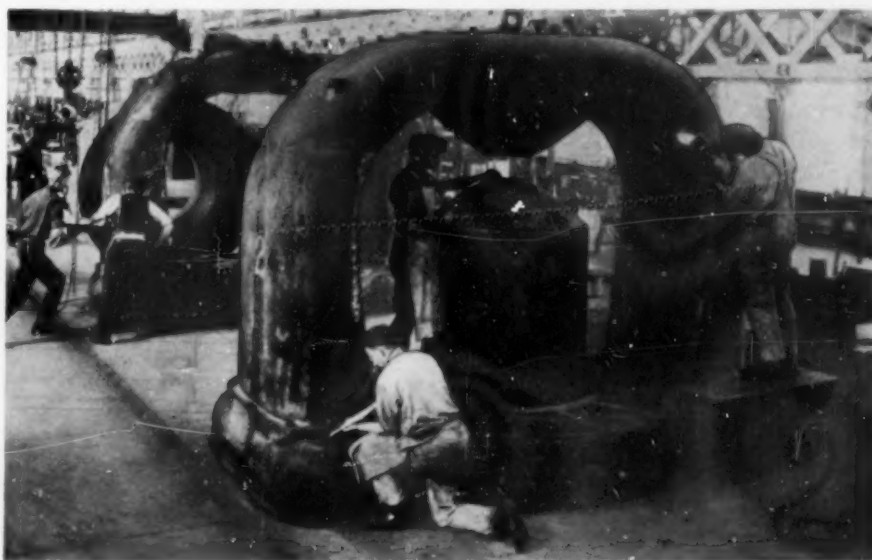
Huge Magnet to be Used In Attack on Heart of Matter

ONE of the largest electromagnets in the world, made to the order of a now defunct Chinese government, will shortly be used at Berkeley, Calif., to help break the speed record for the fastest material particles.

Prof. E. O. Lawrence, in charge of the work at the University of California, will whirl hydrogen atom cores between the poles of this magnet, using a method worked out by him last year in a smaller apparatus.

Five-million-volt protons are the immediate aim of these experiments. From this it is hoped to work up by steps to higher speeds. Calculations indicate that 25-million-volt particles, far exceeding in power previous artificial atomic projectiles, can be produced with the large magnet.

One of a battery of four originally made, two of which accompanied the American Expeditionary Forces to France as part of giant radio outfits, this magnet was never delivered to the Chinese government. (Please turn page)



BUILT ORIGINALLY FOR CHINESE

Frames of the huge magnet which when wound with eight tons of copper wire, will be used in research with some of the smallest particles of matter

The Federal Telegraph Company, whose scientists built the castings, has made one of them available for the atomic physics program of the University of California. The Research Corporation and the Chemical Foundation have cooperated by financing the moving and reequipping of the magnet, a process requiring eight tons of copper windings.

These castings were designed originally to spread a thousand-kilowatt arc between the poles. A similar magnet is still in use for radio transmission at Bordeaux, France.

Speeding protons with energy greater than that produced in a beam of electrons by one million volts have already been achieved by Prof. Lawrence by his method. A moving charged particle like a proton travels in a circular path in the neighborhood of a magnet. The electrically charged atoms gain speed at each revolution between semicircular plates placed between the pole pieces, until they are moving fast enough to be swished outside and used to bombard other atoms.

Fresh attacks on the nucleus of the atom will be made with the help of these intensely powerful atomic projectiles.

ENGINEERING

Better British Planes May Result from Steam Cooling

BRITISH airplanes which are lighter, quicker to start, and less vulnerable to attack are expected to be achieved if the substitution of steam cooling for water cooling of the engines proves effective.

Three new fast bombing planes and a powerful new flying boat have already been equipped experimentally with steam cooling apparatus and results pronounced highly satisfactory. If special tests about to be undertaken are successful, the new cooling system will probably be introduced in all new military planes with which the Royal Air Force is now being re-equipped.

The new cooling apparatus will mean an appreciable decrease in weight because the ordinary radiator will be replaced by a lighter and more compact steam condenser, and because the water needed for engine cooling in the evaporative process is reduced to a very small quantity.

A rival giant magnet recently erected in Leiden, Holland, will actually produce greater electric forces than Prof. Lawrence's apparatus. However, this result is achieved by concentrating the effect of the magnet into a small space. The total flux of magnetic lines between the poles of the California magnet will nevertheless probably establish a record, and it is this feature that is most important for the purpose of the new atom whirligig. A large area of magnetic influence rather than a great force concentrated at one point is needed.

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ARCHAEOLOGY

Woman Archaeologist Finds First Mirrors of Eskimos

A YOUNG woman archaeologist, digging at Cook Inlet, Alaska, has unearthed the first mirrors ever found in a prehistoric Eskimo settlement. These ancient aids to beauty used by women, or perhaps men, in the far north centuries ago, are made of slate. The slate surface had to be dampened in order to reflect the round faces of the owners.

The slate mirrors are merely one high light of the expedition to Cook Inlet



STONE AGE VANITY

Frederica de Laguna, young archaeologist of the University of Pennsylvania, holds the triangular stone mirror which she found while excavating at Cook Inlet, Alaska, last summer.

conducted by Miss Frederica de Laguna with the assistance of Wallace de Laguna and Edwin B. Newman. The expedition was sent out by the University of Pennsylvania Museum last season.

From a scientific standpoint the most important discovery of the expedition was that Eskimos formerly inhabited this region, now inhabited by Indians. The ground around Cook Inlet marks almost the farthest southern advance of the Eskimos into Alaska.

Miss de Laguna and her associates dug into shell heaps by the shore that represent the trash bins of the departed Eskimos. Some of these shell heaps were piled ten to fourteen feet high. In them were found ornaments worn long ago on state occasions. There were lip plugs, beads, an ivory pendant, a carved ivory head, a small buckle, a nose pin. Among the pieces of domestic equipment left in the trash heap were a lamp, a needle case and needles, and the ivory catch which once belonged to a box.

Among the articles in the trash heap discarded by Eskimo men were slate blades for whaling lances, stone hammers, bone awls, stone weights for fish lines, and the socket pieces and foreshafts for harpoons. Lumps of red clay were relics of red paint material used.

The Indians who live in the region know nothing about the Eskimo settlements. That was all before their time. Their traditions go back only to the oldest of their own Indian villages, which are comparatively recent.

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PHYSICS

First Cosmic-Ray Telescope Built at Research Laboratory

Instrument Devised by Dr. W. F. G. Swann Will Measure Intensity and Direction of Strange Radiation from Space

A COSMIC-RAY telescope which will be used to measure the intensity of this mysterious radiation from one part of the heavens for comparison with the strength of the rays from another portion of the skies has been designed and built in the laboratories of the Bartol Research Foundation for the use of Dr. W. F. G. Swann, prominent physicist and director of the laboratory. So far as Dr. Swann knows, no other telescope of this kind has been devised.

Dr. Swann intends to use the instrument this winter and then take it to a place of higher altitude such as the top of Mt. Washington or Pike's Peak, where cosmic radiation is more intense and an investigation of its directional effect can be better carried on.

"It would be very interesting," Dr. Swann told a Science Service representa-

tive, "to be able to pick out a portion of the sky and investigate the amount of cosmic radiation coming from that direction alone, just as we can pick out a part of the sky and estimate the amount of light from that direction."

"It has been suggested," he continued, "that cosmic rays have their origin in the stars. On the other hand, some scientists think that they may originate as a part of the act which constitutes the birth of atoms in interstellar space. In this connection, it is of vital importance to ascertain whether they come to us equally from all directions. Experiments have been made during the night and during the day with very little indication of a difference. Other experiments have been performed, some supporting and others denying the conclusion that the Milky Way indicates itself as in part responsible for the origin of these radiations."

Two strong steel spheres are the chief parts of the cosmic-ray telescope which enable the instrument to accomplish its purpose. They contain gas in which the cosmic rays produce electrical conductivity. The magnitude of this conductivity will be determined by connection to an electrical measuring device. The

apparatus will be so arranged that the conductivity produced in one sphere will have an opposite effect in the measuring instrument to that produced in the other sphere, Dr. Swann explained. Thus if the two spheres were under identical conditions there would be complete cancellation of the effects.

However, a cylinder of lead is fixed between the two spheres. Now the sphere farthest from the direction of oncoming radiation loses, in comparison with the other sphere, an amount of radiation equal to that absorbed by the lead, it was explained.

In a sense, the cosmic-ray telescope is just the opposite of an optical telescope, Dr. Swann stated. It measures not what it receives from a certain direction, but what it is prevented from receiving from that direction. By turning the instrument in different directions, estimates of the cosmic intensity from each direction can be determined.

In order to increase the sensitivity of the apparatus, the two spheres are filled with nitrogen gas to a pressure about 100 times that of the atmosphere. The whole apparatus is mounted as an equatorial telescope so that it can be turned in both vertical and horizontal planes. The distance between the two spheres is seven feet and the weight of the instrument is three tons.

"It will be possible to use the apparatus for purposes other than the mere detection of a directional effect in the radiation," Dr. Swann explained. "For example, if the lead cylinder is replaced by one of copper, it will be possible to compare the absorption of radiation in copper with that in lead."

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PHOTOGRAPHY

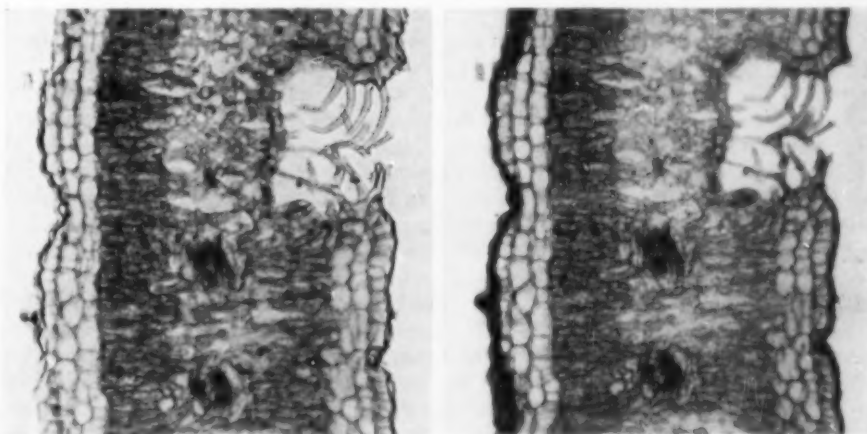
Finer Structures Pictured By Use of Invisible Light

BY USING invisible ultraviolet light that can be seen by photographic plates but not by human eyes it is possible to picture in greater detail the fine microscopic structure of various substances, A. P. H. Trivelli of the Eastman Kodak Research Laboratories, told the Franklin Institute at Philadelphia.

With ultraviolet light just beyond the limits of visibility it is possible to focus the special microscope with green visible light and then take the photograph with mercury vapor lamp light of 365 millimicrons wavelength. For shorter wavelengths of the invisible light, the focusing has to be done in the dark by trial and error photographs.

At wavelengths of 180 millimicrons the air itself becomes opaque to the light and it is necessary to work in a vacuum or in an atmosphere of nitrogen. Quartz must be used for lenses in all ultraviolet light work except that with the longest wavelengths, but at 150 millimicrons wavelength even quartz became opaque.

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SEEING BETTER WITH INVISIBLE LIGHT

At the left is a photograph of a transverse section of an oleander leaf taken with visible green light of 546 millimicrons wavelength, while at the right is the same submicroscopic scene photographed by ultraviolet light of 313 millimicrons, from the same mercury arc. The dark structure around the edge of the leaf, which cannot be seen by the eye, is made visible to the camera with invisible ultraviolet light.

ANATOMY

The Evolution of Smiles and Frowns

Facial Expressions and the Muscles Which Make Them Traced by Scientist from Primitive Mammals to Man

By JANE STAFFORD

WHEN the girl friend smiles and shows her dimples or when friend husband wears a terrible scowl at breakfast, you probably do not stop to consider what mechanism it is that makes a smile or a frown or a dimple.

A hard-working scientist, however, has given the matter much consideration and has even made it the subject of research. He has traced the development of smiles and other facial expressions of mankind from babyhood to old age. Moreover, he has traced the evolution of facial expression, and of the facial muscles that make the expressions, in the mammals, including the primates, up to man. His studies have revealed the factors which enable the human face, and no other, to express complex emotions. He gives scientific explanation of the difference between a Chaplin and a ham actor. He finds that facial expression can be greatly perfected during a person's lifetime, and even if you are no actor, he suggests how you can achieve beauty of facial expression.

This scientist is Dr. Ernst Huber, associate professor of anatomy in the Johns Hopkins University. He says at the beginning of his newly-published book (Johns Hopkins Press, Baltimore) which sums up his 28-year long researches, "The story of the evolution of the muscles of facial expression is the most fascinating story of which I know."

The smile, the frown, the dimple and other far more complex expressions have evolved from a mere grimace, Dr. Huber found. The muscles and nerve mechanism causing them have evolved from one primitive muscle layer innervated by one single nerve, the facial nerve, still seen in lower vertebrates.

In the primitive mammals, this muscle starts in the neck and spreads up below the ear into the face where it has become differentiated into a series of facial muscles. In man this differentiation has gone much farther than in the lower primates. Likewise, the facial nerve in man has branched out enormously so that it can direct the many muscles of the human face.

Part of the facial expression depends on size and location of the muscles, just as your skill in sports depends partly on the size and location of other muscles in your body. The actual structure of the muscles has a lot to do with their function as well.

Muscles come in bundles which are held together by connective tissue called fascia. The word is taken from the same old Latin word as the Italian Fascists have adopted for their name, and is pronounced as if the "sc" were "sh." It originally referred to the bundles of elm or birch rods bound together and carried as symbols of power in ancient Rome. While the Fascists have revived it in its symbolic sense, the anatomists started using it long ago in its literal meaning.

Act Independently

Muscles such as those of the arms and legs are solidly bound together into compact structures by the fascia. The facial muscles, however, are entirely lacking in fascia and instead of all contracting together, like your biceps does, small muscle portions or even single muscle bundles may contract independently.

It is this type of muscle that enables you to wink one eye or lift one eyebrow or one corner of your mouth. Developed to its utmost, it is this type of muscle that is responsible for the great play of expression that you see on the face of a Barrymore or a Lenore Ulrich.

If the fascia extended into the face and spread veil-like over the delicate, thinly bunched mimetic musculature, it would of course make elaborate facial expression impossible, Dr. Huber points out. The mimetic muscles, by which facial expressions are made, lie directly under and next to the freely movable skin. There the inserting muscle bundles are anchored in subcutaneous tissue or firmly attached to the skin itself. The latter method of attachment holds in the region above the eyebrow, between the nose and lip, over the chin and in the lips. Under the influence of the contracting mimetic muscles, the elastic skin is laid into folds, which as a rule are at a right angle to the direction of the muscle bundles.

Dr. Huber explains the difference between a dimple and a wrinkle in the following terms:

"Since in compound facial expression, series of muscle portions with different bundle directions are simultaneously set into action, the wrinkling of the skin becomes complex. In those areas where the muscle bundles insert directly into the cutis (skin), muscle contraction brings forth not wrinkles but grooves or dimples.

"Individual muscle variations, differences in thickness of cutis and subcutaneous tissue, and difference in the elasticity of the skin naturally have modifying influences, thus adding to the individuality of facial expression."

Facial expression has evolved together with the evolution of the facial muscles and with the elaboration of the nerves of the central nervous system, which direct facial muscles, Dr. Huber found from his studies.

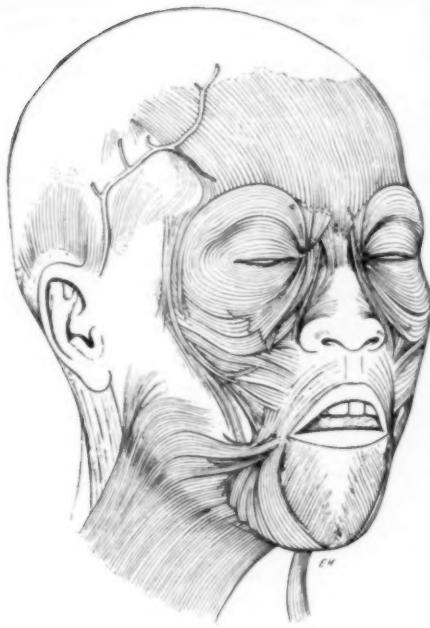
The evolution of the facial muscles has gone in two directions, it appears. Not only has the structure of the muscles undergone change as men developed from his original primitive state, but these muscles have developed differently in different animals as regards function and have reached a high degree of specialization in some instances.

Man's facial expression depends on nervous and emotional factors as well as on muscle structure. The spontane-



THE AMERICAN FACE

Highly differentiated muscles, like those shown in this drawing, make possible the expression of various shades of feeling.



THE CHINESE FACE

Probably one reason why the Westerner has difficulty in reading the Oriental expression is because the underlying muscles are so different from those he is used to.

ous facial expressions seen in man with their manifold delicate shadings result from varied emotional reactions, Dr. Huber pointed out. He concluded that the elaboration of facial expression during the evolution of man closely followed the evolution of emotional life. This in turn depended upon the elaboration of the brain centers concerned with association of ideas and perceptions.

For Fuller Understanding

"We may assume," said Dr. Huber, "that evolving man consciously used and developed certain facial expressions in order to make himself understood to his fellow creatures in a fuller and more definite way.

"In modern man we still occasionally notice imperfect functioning of one or another of the mimetic muscle groups. Thus additional muscles may contract when the contraction of a limited group is intended by the individual."

Dr. Huber gave as an example of this the person who cannot contract the muscles above and between the eyebrows to produce a frown without at the same time tightly closing the eye by contracting another nearby muscle. This is presumably evidence of a less differentiated pattern of expression belonging to an older period in the evolutionary scale. Through special effort and with continued practice such a person may suc-

ceed in eliminating the associated contraction of the muscle which closes the eye and may thereby perfect the independent play of the muscles ordinarily used in frowning.

"We may assume that through such a process of gradual functional perfection, finely graded facial expression has evolved from a lower stage, where crude, grimace-like group action of the mimetic muscles prevailed, as in the facial expression of the anthropoid apes and lower primates," Dr. Huber stated.

"The acquisition and gradual perfection of an articulated language must have played an essential role in the further evolution of the human facial musculature, especially of the muscles about the mouth.

"This explains sufficiently why this muscle group is considerably further differentiated in man than in the great anthropoid apes."

The mimetic musculature is entirely differentiated at birth, Dr. Huber found, but there is practically no facial expression in the new-born baby. Expression evolves very gradually as the mechanisms of sense perception finish developing and the association centers become completely elaborated.

"As the young infant's conscious and intelligent reactions to the surrounding world increase, facial expression becomes more manifold and more definite. There is remarkable progress during the first year, and the second and third years bring further elaboration.

"Facial expression resulting from emotional reactions (upon adequate external stimuli or upon associations of ideas, which invoke memories of past experiences), remains unmasked through childhood. It is thus possible to read in the child's face the true meaning of manifold expressions with all their rich modulations."

"With increasing experience and under the influence of education, the maturing individual learns to control spontaneous facial expression, and thus succeeds to varied degrees in concealing emotions. We may assume that through this educational process emotional impulses which in the child would invariably cause spontaneous response of the facial field, are counteracted or modified by a complex associational mechanism before they reach the facial area of the motor cortex. As a result of this, reading the faces of adults becomes difficult."

It is this educational process, carried out most rigidly, that makes the face of a Chinese appear so inscrutable to Westerners and so difficult to read. Actually, Dr. Huber found from his

studies, the Chinese face is not entirely without emotional expression, but this is so slight that it is unnoticed by the casual Occidental observer.

As a matter of fact, the musculature of the Chinese face is structurally somewhat different, also, which probably increases the Occidental's difficulty in reading expression on an Oriental face. Dr. Huber found that just as the structure of facial muscles differs slightly from person to person, it differs markedly from race to race. He refers to the difference in the facial muscles of Australians, Hawaiians, Chinese and Japanese, Negroes, Whites, American Indians, and Papua-Melanesians. In each race, he points out, there are characteristic types of facial muscles.

Like Glycerine Tears

The importance of the nervous and mental control of facial muscles as well as of their structure becomes apparent from Dr. Huber's investigations and much light is thrown on the art of acting and pantomime. Dr. Huber points out that we can exert voluntary control over the facial muscles and contract various ones of them at will, but when we try to imitate complex facial expressions with all the fine modulations, the attempts fail because they lack spontaneity and truth. In other words, we can shape our lips into a smile, but if we do not feel like smiling, the result is the forced expression so often seen.

"No other example could illustrate this generalization better than vain efforts of poor or mediocre actors," Dr. Huber said. "Truly great actors, capable of strong, deep emotions, live so intensely in their role that with their power of imagination they concentrate on given situations as though these actually existed. Through this their facial expression becomes true."

From his study also come lessons for those of us who would like to improve or beautify our facial expressions.

"Continued mental concentration and experiences deeply felt which, whenever they are recalled to memory, set the mimetic musculature into a state of increased tonus or into contraction naturally help to develop facial expression," Dr. Huber explained.

"Thinking and feeling along noble lines are reflected in the harmonious play of the mimetic musculature. Disturbing associated movements are hereby eliminated and facial expression may thus attain admirable beauty."

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Science News Letter, January 23, 1932

ENGINEERING

Auto Traffic Moves Best At 34.5 Miles Per Hour

THE MOTORIST who honks his horn impatiently when hemmed in by a long line of cars moving too slowly to suit him, ought to spend the time doing traffic research. If he would, he might learn that at 30 miles per hour the number of automobiles that can pass a given point on a one-lane highway is considerably less than it is at 30. This is because cars at 50 miles per hour must have more space between them for safety.

An aerial survey was made of the highway traffic between Washington and Baltimore, Bruce D. Greenshields of Denison University reports in the current issue of *Civil Engineering*. From this survey a formula was derived by A. N. Johnson, of the University of Maryland, which determines the capacity of the highway at various speeds. With this formula as a basis of calculation, the relation of speed to capacity on a one-lane highway has been plotted.

At low speeds, the velocity of the line of cars increases as does the number of cars discharged from the highway, according to the graph. This relation holds until a speed of 34.5 miles per hour is reached. Then the number of cars discharged reduces steadily. At 55 miles per hour the highway capacity is about 2700 cars per hour, while at 34.5 miles this number is approximately 2900.

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PHYSIOLOGY-PHYSICS

Scientist Claims Living Body is Full of Ice

THE LIVING human body is full of ice, Dr. Neda Marinesco of the Paris Institute of Physico-Chemical Biology of the Rothschild Foundation has announced in a lecture given under the Institut de Hautes Etudes.

Science is not content to have only one kind of ice like your refrigerator's. Six different varieties have been discovered by Prof. P. W. Bridgman of Harvard University in the course of his high pressure researches. Variety number six, which Dr. Marinesco has found in the human body, exists at ordinary temperatures, between 40 and 176 degrees Fahrenheit, only under enormous pressures of over a hundred thousand pounds per square inch.

In living tissues this enormous pressure exists because of the great attrac-

tion of the body colloids or jellies for water. This attraction compresses the water and changes it to solid "ice number six," states Dr. Marinesco. That is why it is almost impossible to squeeze a drop of water from a living muscle, though it contains a large proportion of the liquid. When the organism dies, its attraction for water diminishes and the "ice number six" becomes again liquid.

Dr. Marinesco used an original method for determining the attraction for water of the various body colloids, including chiefly proteins, etc. He measured the "dielectric constant" of their solutions by means of high frequency radio waves. This tells whether the molecules of a "polar" substance, such as water, are free to turn around, or whether they are "hooked" to neighboring molecules.

For instance, liquid water has a dielectric constant of eighty units, but when it freezes to ice its dielectric constant drops to two units. Most of the water in the human body has also a dielectric constant of only two units, hence it is akin to ice.

Science News Letter, January 23, 1932

METEOROLOGY

Weather Predictions For Month Ahead Now Possible

WEATHER predictions good for a month are made possible by the fact that abnormal weather during mid-winter and mid-summer often persists over periods of sixty days or more. Forecasts based on this discovery turn out true over 80 per cent. of the time, in certain cases, Charles D. Reed of the U. S. Weather Bureau, Des Moines, stated in a report to the American Meteorological Society.

"The greater the abnormality, the more certain the sequence," said Mr. Reed. "A hot June will be followed by a dry July nearly 100 per cent. of the time in the Mississippi Valley, which is important to corn and cotton. After a cold January, nine degrees or more colder than normal, fuel supplies should be kept flowing into Iowa for in eight out of nine cases, or 89 per cent., the following February is also cold.

"Cold Januarys show marked tendencies to be followed by cold Februarys from the upper Mississippi Valley east over the Great Lakes, Indiana, Ohio and Pennsylvania; also in the Pacific states, Bermuda and Manila."

Science News Letter, January 23, 1932

IN SCIENCE

PHYSICS

Fourteen Points Govern Building of Atom Nucleus

FOURTEEN POINTS for the government of the atom nucleus have been formulated by Prof. William D. Harkins of the University of Chicago.

Physicists will be aided in their search for the secret of the atom nucleus by these rules. The stability and formation of the ninety-two elements of the chemist's periodic table of atoms are intimately governed by them. They relate particularly to the atomic weight and the atomic number.

Nature is most often even in making her atom cores, Prof. Harkins finds. Nearly all atomic nuclei contain an even number of electrons. The atomic number and the number of protons in the nucleus are generally even too.

Elements of even atomic number, the newest data indicate, are ten times more abundant on the surface of the earth or on the sun. In meteorites the atom nuclei of elements of even atomic number are fifty times more abundant.

Science News Letter, January 23, 1932

ENGINEERING

Regulation of Humidity New Feat of Electric Eye

BECAUSE it can almost see invisible moisture in the atmosphere, scientists' electric eye, the photoelectric tube, has been made robot operator of a humidifier which conditions air for human breathing. This unique application of the photoelectric tube is found in newly developed home humidifying apparatus.

A window pane, playing the first-aid part of spectacles, enables the electric eye to detect moisture, because the amount of water that accumulates on a window can be taken as a good measure of moisture in the air. The apparatus directs a beam of light through the window on a photoelectric tube. When moisture is on the glass the light is weakened and the tube responds to turn the humidifier off. When the moisture evaporates, the beam is strengthened and the tube turns the humidifier on.

Science News Letter, January 23, 1932

SCIENCE FIELDS

ENGINEERING

Floodlights Illuminate London's Tower Bridge

See Front Cover

LIGHT from a new age is cast upon the pointed heights of London's Tower Bridge by floodlights turned on the structure during recent engineering and scientific celebrations in England. The Tower Bridge is just one of the many structures illuminated.

This bridge across the Thames, one of the most famous in the world, was completed in 1894. Close by is the sinister and storied Tower of London dating from the time of William the Conqueror. The old Tower has seen many famous people lose their heads and has served as a prison for many others, among them Sir Walter Raleigh and Guy Fawkes.

The Tower Bridge has a central span 200 feet long with 270-foot chain suspension spans on both sides. The central portion of the roadway consists of bascules which are raised to permit the passage of vessels, while just above the draw spans, 142 feet from the water, there is a raised footway.

The towers are of steel, faced with granite and Portland cement.

Science News Letter, January 23, 1932

CHEMISTRY

Tests for New Element 87 Confirmed by Georgians

CRITICISMS made by rivals of Prof. Fred Allison of Alabama Polytechnic Institute on the reliability of experiments by which he claims to have discovered the missing element number 87, have been met by investigators at Emory University.

Prof. J. L. McGhee and Margaret Lawrenz, using an improved model of Prof. Allison's magneto-optic apparatus, confirmed his findings, they have reported to the American Chemical Society. Prof. McGhee and Miss Lawrenz also say that they failed to get results to support the statement of Prof. Jacob Papish of Cornell University, the rival discoverer of the new element, that Prof. Allison's results were due to traces of the known ele-

ments, in this case tin and rhenium.

Prof. McGhee began tests of the still widely doubted magneto-optic method by giving Prof. Allison a number of mixtures of substances whose composition he knew, but which were "unknown" to Prof. Allison. Analysis of their composition made by Prof. Allison with his new magneto-optic method proved to be entirely correct, the report to the Chemical Society states.

In examining Prof. Papish's attacks, Prof. McGhee prepared solutions of pollucite, lepidolite, samarskite and caesium chloride, in all of which Prof. Allison claims to have found element 87. The magneto-optic analysis of these solutions was then compared with that of tin chloride and rhenium chloride, the substances Prof. Papish said might have been responsible for Prof. Allison's findings.

Though certain "minima" were found in common, the six special "minima" of element 87 were not found in the tin and rhenium chloride solutions, the report states. The Georgia scientists believe that this test invalidates Prof. Papish's criticism.

Science News Letter, January 23, 1932

PHYSIOLOGY

Soup Has Different Taste To Different Individuals

THE SAME kettle of soup may have entirely different tastes to different persons eating it, Dr. Roger J. Williams of the University of Oregon suggests in a report to *Science*.

Creatine, a chemical in the muscular tissue of meat, tastes decidedly bitter to some, but is as tasteless as chalk to others, he has found.

Dr. Williams made his discovery during an attempt to identify an unknown substance which he thought might be creatine. Creatine is described in chemistry texts as being bitter, but this sample was absolutely tasteless to both Dr. Williams and to an associate working with him. Further study convinced them that the substance was actually creatine, however, so they got others to taste it. It was not until five persons had tried it, that a "bitter" taster was found.

Since a pound of lean meat may contain nearly two grams of creatine, Dr. Williams points out, it would be surprising if meats did not have very distinctive flavors for different persons.

"Especially should this be so for soups made from lean meat which must contain a considerable quantity of extracted creatine," Dr. Williams said.

Science News Letter, January 23, 1932

ARCHAEOLOGY

Germany was Arsenal Even in Yew-Bow Days

GERMANY did not have to wait for the Krupps to become a great source of warlike weapons, it appears from a study in the German conservation journal, *Naturkunde und Naturschutz*. In the middle ages, when the stout yew bow was the standard "shoot-in-iron," the land beyond the Rhine had an important export trade in bows. Even as late as the sixteenth century, well after the invention of gunpowder, a single firm in Nuremberg sold 600,000 of these weapons during a period of sixty years—an average of 10,000 bows a year.

Many of the bows exported from Germany went to England, where in consequence of almost incessant warfare, both foreign and civil, the yew was exterminated as a source of good staves by the year 1500. The demand in Germany became so great that the supply was over-cut, and finally even in the Alps the yew stood in danger of extermination. In one Bavarian district alone, 10,000 yews were cut down in the year 1588. In the following year, further cutting of yews was forbidden in Bavaria by government edict.

At present yews are being carefully preserved by German government agencies, and it is estimated that there now exist in the country something over 25,000 yew trees.

Science News Letter, January 23, 1932

ZOOLOGY

Efforts Made to Preserve Sumatra's Wild Elephants

SUMATRA still has some wild elephants, and it is the only island in the great Dutch East Indian empire that can claim that distinction. Hence, an effort is being made to establish a preserve where they may be protected against the hunters who kill them for their ivory and the traders who capture them and lead them into servitude.

In former centuries, particularly during the power of the Atjeh princes, elephants were very largely used as beasts of burden, but in the last decade they have been much exported. Because of the dangers and difficulties of sea transportation, a measure was passed in 1909 forbidding capturing or killing of certain wild animals, particularly elephants.

Science News Letter, January 23, 1932

GEOLOGY

Rocks Tell How They Were Formed

"A Classic of Science"

Studying Thin Sections of Rock and Crystal Occlusions Showed Sorby How Lava, Granite and Other Rocks Began

ON THE MICROSCOPICAL STRUCTURE OF CRYSTALS, indicating the Origin of Minerals and Rocks. By H. C. Sorby. In *Quarterly Journal of the Geological Society of London*. Vol. XIV. London: 1858.

IT THEREFORE appears that the fluid-cavities indicate that all the elvans and granites I have hitherto examined were consolidated under pressures varying from about 18,000 to 78,000 feet of rock. These are certainly very great pressures; but, bearing in mind that they probably represent the forces concerned in the elevation of mountains, I think they are sufficiently reasonable. They also correspond very well with the pressure under which, in many cases, the lava at the foci of modern volcanic activity must become solid, as is well illustrated by the Peak of Teneriffe. It is upwards of 12,000 feet high, and the bottom of the ocean from which the volcanic district of the Canary Islands rises is 12,000 feet deep, and at no great distance westward it is 16,800 feet (Lieut. Maury's *Physical Geography of the Sea*, 1st edition, plate xi.). If, as is sufficiently probable, the lava at a great depth extends some distance westward of the exhibition of volcanic activity at the surface, there must be a considerable thickness of rock between it and the bottom of the ocean, or else it could not, as it does, resist the pressure of a column of lava at least 20,000 feet high, when an eruption takes place from the Peak. If a few thousand feet is sufficient for that purpose, when the internal forces are relieved by an eruption of lava near the summit of the Peak, there would be a pressure of an actual column of at least 30,000 feet of melted rock on the lava at the base. Probably, however, part of the lava is at a greater depth than a few thousand feet below the general bed of the ocean, and the pressure may be more when not relieved by an eruption, and therefore it appears to me reasonable to suppose it might in some cases be solidified

under double that pressure. At all events the best conclusions we can deduce from this modern volcano agree so well with the amounts calculated from the fluid-cavities in granitic rocks, that I cannot but conclude that the pressure under which granites and elvans were consolidated was of the same order of magnitude as the pressure under which the lava of modern volcanoes must be solidified at the foci of their activity, as though these rocks were the unerupted lavas of ancient volcanoes, variously protruded amongst the superincumbent strata.

Temperature of Rocks . . .

As is well known, the temperature of rocks increases with the depth; and it becomes an interesting question to determine whether the rate of increase might give the temperature deduced from the fluid-cavities in the quartz of the trachyte of Ponza, at a depth which would correspond with the amount of pressure deduced from a comparison with those in the quartz of granite. According to M. Cordier (*Edinburgh New Philosophical Journal*, 1828, vol. iv. p. 273), the rate of increase is not uniform in all countries, being in some as rapid as 1° F. for each 24 feet, and in others not more than 1° degree for each 104 feet, as if owing to an irregular distribution of the subterranean heat. If the increase was the same for great depths, there would be a temperature of 680° F. at a depth varying from 15,100 to 65,500 feet. According to Mr. R. W. Fox (*British Association Report for 1857*, p. 96), the rate of increase in various mines in Cornwall is by no means uniform, but varies from 1° for each 32 feet to 1° for 71 feet, being on an average 1° for 49 feet, which would give a temperature of 680° at a depth of 30,900 feet. However, he states expressly that the increase is more rapid in shallow than in deep mines; and, according to information kindly furnished to me by Mr. Robert Hunt, the rate is 1° for every 50 feet in penetrating through the first 100 fathoms; for the next 100

fathoms 1° for 70 feet; whilst, when the depth exceeds 200 fathoms, it is only 1° for each 85 feet of depth. If this be the true rate of increase far below the surface, there would be a temperature of 680° F. at a depth of about 53,500 feet. These results will be best compared with the pressures under which granites were most probably formed, by means of the following Table:—

Depth in Feet

Cordier's results	15,100 to 65,500
Fox's mean	30,900
Hunt's results	53,500

Pressure in feet of Rock

Various granites	32,400 to 78,000
Cornish granites	32,400 to 63,600
Mean of ditto	50,000

It will thus be seen that, if the rate of increase to a very great depth is the same as near the surface, the calculated temperature would occur at a less depth than corresponds with the calculated pressure, although the general order of magnitude of the two quantities is very similar; whilst, if the rate of increase to a very great depth is the same as below 200 fathoms, it would occur in Cornwall at a depth which corresponds remarkably well with the calculated mean pressure for the granites in that district. Very variable elements enter into the calculations; there are many possible sources of error; the number of feet of rock expressing the pressure might differ very considerably from the actual depth, and the distribution of heat in the earth's crust, when the granite was consolidated, might not be the same as now. Still, however, we must admit that the rate of increase in the

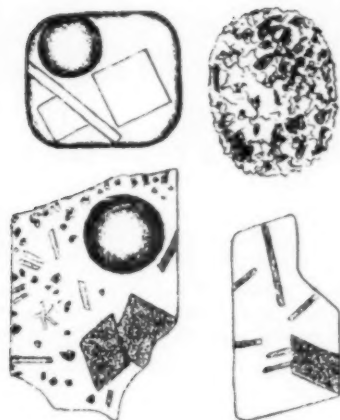
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THE NEXT CLASSIC OF SCIENCE



CAVITIES IN VOLCANIC ROCKS

Sorby was able to prove that volcanic rocks contain water as well as glass occlusions, showing chemical action in their formation as well as simple melting and solidifying.

heat of the rocks indicates that the temperature at which the quartz of granite probably crystallized would in all probability occur at a depth agreeing very well with the pressure to which it appears to have been exposed. Since, then, as I have already shown, the metamorphic rocks near the granite crystallized at about the same temperature as the granite itself, I think, even if we do not give our entire assent, we must acknowledge that the above fact is a strong argument in favour of the supposition that the temperature concerned in the normal metamorphosis of gneissoid rocks was due to their having been at a sufficiently great depth beneath superincumbent strata.

It will, therefore, be seen that the application of the principles I have described leads to many very striking and remarkable results, which agree so extremely well amongst themselves and with other general circumstances, that I cannot for one moment believe them to be the effect of accident. On the contrary, they clearly point to definite laws; and though, in the infancy of such a wide subject, involving many very difficult physical questions, considerable errors cannot be avoided, yet the character of the results indicates that the general principles are correct.

With respect, then, to minerals and rocks formed at a high temperature, my chief conclusions are as follows. At one end of the chain are erupted lavas, indicating as perfect and complete fusion as the slags of furnaces, and at the other end are simple quartz veins, having a structure precisely analogous to that of crystals deposited from water. Between these there is every connecting link, and

the central link is granite. When the water intimately associated with the melted rock at great depths was given off as vapour whilst the rock remained fused, the structure is analogous to that of furnace slags. If, however, the pressure was so great that the water could not escape as vapour, it passed as a highly heated liquid holding different materials in solution up the fissures in the superincumbent rocks, and deposited various crystalline substances to form mineral veins. It also penetrated into the stratified rocks, heated, sometimes for a great thickness, to a high temperature, and assisted in changing their physical and chemical characters, whilst that remaining amongst the partially-melted igneous rock served to modify the crystalline processes which took place during its consolidation. These results are all derived from the study of the microscopical structure of the crystals; but my own observations in the field lead me to conclude that they agree equally well with the general structure of the mountains themselves, and serve to account for facts that could not have been satisfactorily explained without the aid of the microscope. And here I cannot but make a few remarks in conclusion on the value of that instrument, and of the most accurate physics in the study of physical geology. Although with a first-rate microscope, having an achromatic

condenser, the structure of such crystals and sections of rocks and minerals as I have prepared for myself with very great care can be seen by good day-light as distinctly as if visible to the naked eye, still some geologists, only accustomed to examine large masses in the field, may perhaps be disposed to question the value of the facts I have described, and to think the objects so minute as to be quite beneath their notice, and that all attempts at accurate calculations from such small data are quite inadmissible. What other science, however, has prospered by adopting such a creed? What physiologist would think of ignoring all the invaluable discoveries that have been made in his science with the microscope, merely because the objects are minute? What would become of astronomy if everything was stripped from it that could not be deduced by rough calculation from observations made without telescopes? With such striking examples before us, shall we physical geologists maintain that only rough and imperfect methods of research are applicable to our own science? Against such an opinion I certainly must protest; and I argue that there is no necessary connexion between the size of an object and the value of a fact, and that, though the objects I have described are minute, the conclusions to be derived from the facts are great.

Science News Letter, January 23, 1932

ASTRONOMY

Fragments of Falling Stars Caught Drifting to Earth

Fragments of falling stars drift gently down through the earth's atmosphere, Dr. Maud W. Makemson, professor of astronomy at Rollins College, Florida, has concluded after a series of experiments during the November meteor showers.

The experiments consisted in catching the tiny globules or meteoric dust particles in large pans, placed on a high diving tower in Lake Virginia, on the Rollins campus. The fragments were easily distinguishable from ordinary dust and soot by their shape, color and formation. Except when shattered by impact with the receptacle, or in handling, they are usually round or of regular form. In substance they resemble volcanic glass or obsidian, while in color they range from clear glass to amber, or through amethyst to smoky gray.

An interesting feature of the glass globules is that they are electrified or magnetic, which might be expected from the fact that they pass through an electrified stratum of air far above the earth.

It is a well-known fact that while thousands of meteors enter or traverse the earth's atmosphere daily, very few meteorites ever fall intact to the surface of the globe. The fall of meteors is always accompanied by a brilliant light and usually followed by an explosion of the heated gases when the collision with the ground occurs. Consequently the fall on inhabited regions of the globe can hardly pass unrecorded.

From the thousands of meteors which explode in the air or are completely consumed by the intense heat generated in their swift motion, the tiny glass globules are formed as the result of rapid



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cooling in the frigid upper air. The colors are due to the various mixtures of minerals of which the original meteor was composed.

Dr. Willard J. Fisher of Harvard College Observatory, whose collection of cosmic dust has extended over a period of thirty years, has practically eliminated all alternatives for explaining their origin as terrestrial, having examined dust from furnace flues, locomotive smoke stacks and other sources. In Dublin, Ireland, Hartley and Ramage collected dust from the showers of Leonids in November, 1897. In France, Lucien Rudaux is at present investigating along this line.

Dr. Makemson believes that conditions in Florida are almost ideal for the collecting of meteoric particles, owing to the level, well vegetated surface, the falling currents of air, and the absence of factories and industry. She has transferred her experiments to Lake Conway, at a distance of several miles from any town, in order to eliminate smoke particles and terrestrial dust as far as possible. Her plan is to continue the collecting over a period of six months, keeping the results of each week separate, and to compare the fall of dust with the observations of meteors, as reported by members of the American Meteor Society. She believes that if a correlation between the amount of dust and the number of meteors can be found, this fact will be an additional proof of the cosmic origin of the tiny globules.

Science News Letter, January 23, 1932

AERONAUTICS

Green-Red Beacon May Direct Air Port Traffic

A RED and green flash beacon for the "traffic cop" of the air port has been designed by the Aeronautics Branch of the U. S. Department of Commerce and is now being tested to determine how it may be best used.

The beacon is in reality a light weight, powerful searchlight, so small that it can be held conveniently in one hand. Instead of throwing a beam of white light, green and red signals can be accurately aimed at aircraft about to take off or approaching the field for a landing. On a clear day with the sun shining both red and green signals can be seen from a distance of six or eight miles. In fact, if a distant plane is visible to the air port operator, he may be sure that his signal will be seen by the pilot.

Science News Letter, January 23, 1932

ENGINEERING

Electric Devices Controlled Over Wire Supplying Power

Water Heaters and Street Lights Switched On and Off by "Carrier-Currents," Traveling at High Frequency

ELECTRIC water heaters and other such devices in thousands of homes may be turned on and off at the proper hours by an extra electrical message sent over the same wires that bring the current to operate them, and controlled by an engineer at his desk in a distant power plant.

By the same new development, which the General Electric Company has announced, 800 street lights in Springfield, Mass., are already being lighted and extinguished from one central point without the use of scattered control apparatus and extra wiring or hand operation of switches.

The currents that do the control work, having different characteristics from that which supplies power, travel on the same wire with the big power current. The regular power currents in general use travel at 60 cycles or 120 alternations per second while the message-bringing "carrier-currents" travel at much higher frequencies. The carrier currents for street lights use a frequency of 480 cycles per second, and those for controlling water heaters em-

ploy 720 cycles. They travel over the wire for very brief periods, just long enough to operate the control devices, although there is no reason why they could not flow as steadily as the service current.

This method of control of electric water heaters is seen by engineers as an inducement to make their use more widespread. Electric water heating has proved most satisfactory when electricity for this purpose is used at night only. Then there is little demand for power and it can be purchased cheaply. The carrier-currents can be used to turn the heaters on when the demand for electric power is light and it can be spared for water heating.

These carrier-currents, engineers state, are the same form of electrical energy which, superimposed upon high-voltage currents, is sent over high-tension transmission cables for telephone communication. They say that it is technically possible to "crowd" a transmission wire with many carrier-currents without interference with each other or with the regular service current.

Science News Letter, January 23, 1932

MEDICINE

One Dead, Nine Sick From Parrot Fever in California

TEN CASES of parrot fever with one death in California have been reported to the U. S. Public Health Service. The fatal case was that of Walter R. Kaestner, the U. S. customs inspector at San Pedro, port of Los Angeles. The connection between this case, the other nine, and a vendor who has been wandering up and down the state selling parrots has not yet been made clear.

A report from the city health officer of Los Angeles states that the customs inspector in the course of his duties handled three shipments of birds during

December. Since the outbreak of parrot fever in this country in 1930 parrots shipped into this country must be held in quarantine by the customs officials for a period of observation, to determine whether or not they are suffering from the disease.

The San Pedro inspector is reported to have taken two parakeets and two rice birds home to his wife. The two rice birds from Java are still alive and well. The inspector died with typical symptoms of parrot fever, according to the Los Angeles city health officer.

Science News Letter, January 23, 1932

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ASTRONOMY

New Speed Record Established By Distant Part of Universe

A DISTANT portion of the universe is apparently rushing away at a speed greater than any previously observed by astronomers.

In a communication to the executive offices of the Carnegie Institution of Washington, Dr. Walter S. Adams, director of the Mount Wilson Observatory at Pasadena, Calif., reports the discovery in two nebulae of apparent movement away from the earth at the rate of 15,000 miles per second. The highest velocities thus far indicated by observation have been of the order of 12,500 miles per second.

The two objects which seem to be rushing away from the earth with the speed of an explosion are very faint nebulae in a cluster discovered by Dr. Edwin P. Hubble in the constellation of Gemini. Estimate of their apparent speed is based upon an observation made by Milton L. Humason. They have been determined to be 135,000,000 light

years distant from the earth, a very great distance but not quite as far as the frontier of observable space. Light travels at the rate of 186,000 miles per second.

This discovery is expected to be of special concern to Dr. Albert Einstein and Dr. Willem de Sitter, famous Dutch astronomer, who are now in Pasadena, because of their interest in research concerning the possible expansion of the universe. It also extends our knowledge of the relation between distance and apparent rate of recession or movement away from us of distant nebulae as described by Dr. Hubble.

The fact that our Milky Way galaxy is apparently the center from which other groups of stars or nebulae are rushing at speeds of thousands of miles per second has been the matter of first importance to astronomers since it was discovered at the Mount Wilson Observatory. Evidence of the phenomenon

was given by the huge 100-inch telescope there, the largest in the world, as a shift toward the red of lines in spectra of the nebulae. The more the lines are removed from their normal positions, the faster the nebulae are traveling away from the earth, it was concluded.

It has been suggested, however, that the nebulae may not be receding as fast as they seem and that a revision of the present accepted theories may be necessary. To verify this evidence and determine whether the universe is actually expanding is a major problem of astronomers today.

Science News Letter, January 23, 1932

METEOROLOGY

Change in Air Gases Would Bring On Disaster

DISASTER in many forms would come to the earth if the odds and ends of the atmosphere were tampered with in some unfortunate way, data assembled by Dr. W. J. Humphreys, of the U. S. Weather Bureau, show.

Without water vapor, which even in the wettest parts of the earth constitutes only one per cent. of the atmosphere, no plant and no animal life would be possible and the whole earth would be as dead and barren as the moon. There would be winds, Dr. Humphreys says, but never a shower. Clouds would be everywhere, though only of fine pulverized rock such as now fills, some believe, the atmosphere of our neighboring planet, Venus.

The small amount of carbon dioxide in the air, Dr. Humphreys explains, is absolutely essential to plant life, and, since all animal life is dependent, directly or indirectly, upon plants, the removal of carbon dioxide would result in the extinction of life on earth.

High above the earth some 25 to 30 miles there is an amount of ozone so small that if brought together at average outdoor temperature and pressure it would make a sheet only about a tenth of an inch thick. If this gas were removed, Dr. Humphreys explains, our eyes would soon go blind from the action upon them of that portion of the ultraviolet solar radiation which at present it shuts out completely. If on the other hand the quantity of ozone were increased several fold, the ultraviolet light now reaching earth would be excluded, no vitamin D would be formed by it and there would be a rapid extinction of most if not all animal life, including man.

Science News Letter, January 23, 1932



Green-wing Teal

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ORNITHOLOGY

Nature Ramblings

By FRANK THONE



Bittern

THOUGH a relative of the poor, over-hunted herons, the bittern has succeeded in holding its own much better in the struggle to maintain existence on a continent rapidly becoming too much civilized for aboriginal birds, as it long ago became too much civilized for aboriginal men. This may be due to a number of things: for one, the bittern is not as handsome as the heron, so we are not so anxious to secure bits of his carcass to adorn our womenfolk withal. Then, too, the bittern is master of the art of camouflage. He is marked in stripings and streakings of light and dark brown, so that he matches exactly with the surrounding dry vegetation, and he has a trick of "freezing" in position, his head canted back and his long bill pointing skyward, that makes him look like a stump or a clump of reeds.

The vocal efforts of the bittern are remarkable, though not for melodious sweetness. When he is about to sing, he goes through all the preliminary efforts of violent regurgitation, but all that comes of it is a sound like that of an old wooden pump refusing to bring up water. Hence he has received the colloquial name of "pumper." At a distance the sound no longer resembles that of a pump, but more nearly suggests some one pounding a stake with a maul; so that he is also called "stake-pounder." Other names that his vocalizing have brought upon him are "butter-bump," "marsh drum," "thunder pumper" and "bog bull."

The bittern is one of the most widely distributed of North American birds. He courts his mate and rears his family all the way from central British Columbia, Keewatin and Newfoundland south to California, Arizona, Kansas, the Ohio valley and North Carolina.

Science News Letter, January 23, 1932

ARCHAEOLOGY

Nine Pairs of Stucco Feet Discovered in Mayan Ruins

NINE PAIRS of little feet and legs in a neat row, all that is left of nine seated figures in a stucco bas relief—this intriguing piece of ancient art has been discovered at Yaxchilan, Mexico, by archaeologists of the Carnegie Institution of Washington. Results of the Institution's latest archaeological expeditions in the Mayan country have been announced. The excavations at Yaxchilan were under the direction of Dr. Sylvanus G. Morley.

Did the nine pairs of stucco feet belong to the nine most mysterious gods of the ancient Mayas? This thought sprang into the minds of the archaeologists who found the broken piece. Old writings about the Mayan Indians emphasize a special group of nine gods, but tell little about them. Even their names are unknown. According to one interpretation these nine were the gods of the Mayan underworld.

The broken slab will never show the faces or reveal the identities of the dignitaries who once sat so stiffly in a row, for the upper portion of the slab is hopelessly destroyed. When perfect, the piece was not more than a foot and a half high, even if the seated figures wore the most towering of Mayan feathered headdresses.

Yaxchilan, where the stucco figures were found, was one of the Mayan cities in the Usumacinta Valley of Mex-

ico. In this valley a number of outstanding cities of the Old Mayan Empire stood in early centuries of the Christian era. Palenque was one of these and Piedras Negras another.

Yaxchilan was perhaps the most spectacular site of them all, perhaps the most spectacular in the Mayan area, declares Dr. Morley. The builders chose a superb natural setting of hills and river for the temples and official buildings. Along the bank of the curving Usumacinta River, a line of buildings, almost continuous, was erected.

Twelve Monuments

On the first bench level above the river was set a series of courts and plazas. And beyond and above these courts, where the hills rose, the Mayan builders constructed a second row of buildings paralleling the river row. The very summits of the hills were leveled that buildings might stand on them crowning the scene.

Twelve important hieroglyphic monuments which show the age of the site were found by the Carnegie expedition. One of these monuments is the oldest known date stone set up by the Mayas in the Usumacinta Valley. It appears that this valley was a place of settlement as early as the third century A. D.

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• First Glances at New Books

Physics

THEORETICAL PHYSICS, VOL. I, MECHANICS AND HEAT (NEWTON-CARNOT)—W. Wilson—*Dutton*, 332 p., \$6. Prof. Wilson of the University of London intends this volume to be the first of a three-volume work which will embrace the whole of theoretical physics up to the present. It had begun to look as if this were impossible outside of the big German reference handbooks. Prof. Wilson promises to set things right by reducing the huge bulk of classical and contemporary theory to a presentation that can be really digested in a reasonable time. The present volume is classical with the exception of a mention of the Schrodinger equation. Significant is the fact that despite this, the first chapter begins with a description of the Tensor analysis, which has been used so extensively in relativity and other recent developments.

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Horticulture-Botany

FLOWERS OF THE WILD: THEIR CULTURE AND REQUIREMENTS—Frank C. Pellett—*A. T. De La Mare Co.*, 160 p., \$2. The wild garden, and the use of some of our beautiful native species, are making gratifying progress in American gardening. This little book tells of some of the best plants to use, and gives practical hints for their transplantation and care.

Science News Letter, January 23, 1932

Psychology

READINGS IN INDUSTRIAL PSYCHOLOGY—Bruce V. Moore and George W. Hartmann—*Appleton*, 560 p., \$5. Carefully selected extracts from the writings of prominent psychologists, personnel men and business men, discussing many aspects of the problem of how to deal with the human element in industry. Biographies of the two-hundred-odd authors add interest and value to the volume.

Science News Letter, January 23, 1932

Conservation

CONSERVATION IN THE DEPARTMENT OF THE INTERIOR—Ray Lyman Wilbur and William Atherton Du Puy—*Government Printing Office*, 253 p., \$1. A generation ago conservation was a fighting word; now it is an accepted and settled national policy, and the only surviving controversies are over details of conserving more and

conserving longer. The senior author of the present book, as Secretary of the Interior, is directly in charge of much of the major conservation and reclamation work of the government in such varied fields as mineral resources, national parks and irrigation projects. He is therefore in an especially good position to tell the story of the present status of conservation in his department. The text is well adapted for use in schools, and there are many excellent illustrations.

Science News Letter, January 23, 1932

Dietetics

LIVING THE LIVER DIET—Elmer A. Miner—*Mosby*, 106 p., \$1.50. A physician who has himself struggled with the liver diet for pernicious anemia gives in this small volume the benefit of his experiences. The book is intensely practical, with menus, recipes and tables of food values and of weights and measures, as well as discussion of the various classes of foods and their importance to the patient. Dr. William P. Murphy of Harvard University Medical School, who with Dr. George R. Minot first used liver to treat pernicious anemia, has written an introduction.

Science News Letter, January 23, 1932

Ornithology

A LIST OF BIRDS RECORDED FROM THE BERMUDAS—T. S. Bradlee, L. L. Mowbray and W. F. Eaton—*Boston Society of Natural History*, 103 p., 3 maps. An annotated checklist which will be of interest to systematic ornithologists.

Science News Letter, January 23, 1932

Physiology

THE HUMAN VOICE, ITS CARE AND DEVELOPMENT—Leon Felderman—*Holt*, 301 p., \$2.50. Designed for teachers and students of singing, this book has much in it that will interest the general reader, particularly if he has an interest in music and voice production. Dr. Felderman describes the sound mechanism in lower animals and the physiology and anatomy of speech, singing and hearing in man. He then takes up various abnormalities and diseases of the auditory and vocal organs which may affect anyone but which are particularly important for the singer to know about. The book is written in non-technical, pleasing style and is illustrated with numerous diagrammatic drawings.

Science News Letter, January 23, 1932

Geography-Anthropology

GEOGRAPHY OF THE MEDITERRANEAN REGION—Ellen Churchill Semple—*Holt*, 737 p., \$4. Ancient history texts are common enough; but here is an ancient geography. Prof. Semple has studied the lands around the Mediterranean in order to understand the part that geography played in Greek, Roman and other Mediterranean civilizations. Commercial as well as physical geography is taken into account. Trade routes, pirate coasts, climatic factors in settlement, irrigation, stock-raising, gardens are among the many topics discussed. Citation of numerous authorities at the end of each chapter is a feature of the book which enhances its usefulness as a reference work to students of anthropology, classical archaeology, and ancient history.

Science News Letter, January 23, 1932

Medicine

ON THE EDGE OF THE PRIMEVAL FOREST—Albert Schweitzer; trans. by C. T. Campion—*Macmillan*, 180 p., \$2. Dr. Schweitzer tells how he founded a hospital for natives in equatorial Africa and of his medical work there. Physicians and surgeons accustomed to the well-equipped and well-staffed hospitals of American and European cities will be particularly interested in this story of medical pioneering. The book is written in a non-technical, interesting style and will appeal to the general reader.

Science News Letter, January 23, 1932

Meteorology

SMITHSONIAN METEOROLOGICAL TABLES—*Smithsonian Institution*, 282 p., \$2. The fifth revised edition of this useful work, based on Guyot's Meteorological and Physical Tables.

Science News Letter, January 23, 1932

Engineering

COMMUNICATION—David O. Woodbury—*Dodd, Mead and Company*, 280 p., \$2.50. This is the first volume in a group of books on the story of man's achievements. The rapid improvement of man's methods of communication forms an exciting story which is here told. The description of present-day practices is full. The point of view of the narrative is simple, there being no discussion of the technical questions involved or of the forces which gave rise to so many inventions in such a short time.

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